DOE program speeds development of leading-edge automotive systems

OAAT ACCOMPLISHMENTS

Cooperative Automotive Research for Advanced Technology (CARAT) Program

Challenge

Small businesses, colleges, and universities possess an abundance of creativity, resourcefulness, entrepreneurial spirit, and good old American know-how. Harnessing those capabilities can accelerate the commercialization of innovative automotive technologies that contribute to the production of vehicles having ultrahigh fuel efficiencies.

Technology Description

The U.S. Department of Energy's (DOE) Cooperative Automotive Research for Advanced Technology (CARAT) Program speeds the commercialization of promising automotive technologies from small businesses, colleges, and universities by funding their development from bench-scale models through to the production prototype stage.

The CARAT Program begins by selecting advanced, energy-efficient systems that already have a firm technical basis. Funding then proceeds in three phases. At the completion of each phase, DOE chooses the projects that are worthy of further support. The program has sponsored research into advanced batteries, diesel engines, electric motors, fuel cells, lightweight materials, power electronics, and vehicle systems.

Accomplishments

Twenty-six projects were funded for Phase 1 development, each at about the $150,000 level. Seven of these projects were selected for Phase 2 funding. A second group of Phase 1 projects was solicited, and five projects were chosen for funding.

Accomplishments vary from one project to the next. A typical project that reached Phase 2 involves the University of Michigan's work on water-gas shift catalysts, which remove contaminating carbon monoxide (CO); CO in the fuel degrades the performance of the fuel cells. The university developed carbide catalysts coated with active transition metals, which improved on commercial catalysts by (1) achieving higher conversion of CO to benign CO_2; (2) resisting deactivation when exposed to condensed water during thermal cycling; (3) being more tolerant of sulfur in fuel; and (4) being comparable to commercial catalysts in material costs.

Benefits

CARAT hastens the introduction of advanced energy-efficient automotive components and systems by funding innovations by small businesses, colleges, and universities that might otherwise lie dormant. The CARAT Program brings these pioneering ideas and concepts to the attention of the automotive industry in a way that matches the industry's current and projected needs, thereby helping to maintain the competitiveness of the domestic automotive industry in the international marketplace.

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Commercialization

The CARAT Program expressly encourages commercialization of innovative projects in Phase 3. This phase requires partnering with an existing automotive supplier or a company with the financial and technical resources to be a significant supplier to the automotive industry worldwide.

Future Activities

The next step in the CARAT Program involves selecting which of the seven projects that reached Phase 2 will receive Phase 3 funding. When the second group of Phase 1 projects reaches completion, the most worthy projects will be selected for additional funding in Phase 2. A third-round solicitation for new projects is also planned.

For example, should the University of Michigan's catalyst work receive Phase 3 support, future activities would include: (1) preparation of highly active, sulfur-tolerant, monolith-supported catalysts; (2) demonstration of improved performance in a prototype fuel processor; and (3) confirmation of the cost competitiveness of the transition-metal carbide catalysts.

Partners in Success

- Small businesses
  BST Systems, Energy Conversion Devices, Makel Engineering, NexTech Materials, Superior Graphite, and Virginia Power Technologies
- Colleges and universities
  Illinois Institute of Technology, North Carolina State University, Pennsylvania State University, University of Miami, University of Michigan–Ann Arbor, and University of Michigan–Dearborn
- Automotive industry manufacturers and suppliers